

TABLE OF CONTENTS

A. ADVANCED STATISTICAL THEORY

FUNDAMENTALS OF ANALYSIS OF VARIANCE, <u>Charles R. Hicks</u> , Assistant Professor of Mathematics and Research Associate in Statistical Laboratory, Purdue University, Lafayette, Indiana-----	547
COMPONENTS OF VARIANCE AND MIXED MODELS, <u>R. L. Anderson</u> , University of North Carolina, Raleigh, North Carolina-----	633
EXPERIMENTS WITH MANY FACTORS, <u>K. A. Brownlee</u> , Statistical Research Center, The University of Chicago, Chicago 37, Illinois-----	565
ANALYSIS OF COVARIANCE, <u>Irving W. Burr</u> , Professor of Mathematics and Research Associate in Statistical Laboratory, Purdue University, Lafayette, Indiana-----	625

B. AIRCRAFT

ULTRASONICS - THEORY AND PRACTICE, <u>W. C. Hitt</u> , Assistant Chief, Quality Control, Douglas Aircraft Company, Incorporated, Santa Monica, California-----	57
IMPROVING VENDOR QUALITY PERFORMANCE, <u>David A. Hill</u> , Director of Quality Control, Hughes Aircraft Company, Culver City, California-----	213
THE TEST PILOT'S ROLE IN QUALITY CONTROL, <u>John I. Nestel</u> , Director of Quality Control, Aviation Engineering Division, Avien-Kniickerbocker, Incorporated, Woodside 77, New York-----	211
S.Q.C. APPLICATIONS FOR IMPROVING AIRCRAFT AND ENGINE MAINTENANCE, <u>A. M. Hull</u> , Supervisor of Maintenance, and <u>W. W. Wilcox</u> , Manager of Inspection and Quality Control, United Air Lines, South San Francisco, California-----	333
THE AIR FORCE PROCUREMENT QUALITY CONTROL PLAN, <u>Carl F. Damberg</u> , Colonel, USAF, Chief, Quality Control, Headquarters Air Material Command, Wright-Patterson Air Force Base, Ohio-----	499
ESTABLISHMENT OF QUALITY LEVEL THRU COMPONENT AND SYSTEM TESTING <u>Ralph S. Reade</u> , Chief of Systems Installations, Consolidated Vultee Aircraft Corporation, Fort Worth, Texas-----	627

C. ARMED SERVICES - ORDNANCE

THE USE OF CONTINUOUS SAMPLING IN AMMUNITION PROCUREMENT, <u>Robert L. Storer</u> , Chief, Quality Control Branch, Ordnance Ammunition Center, United States Army, Joliet, Illinois-----	523
STATISTICAL QUALITY CONTROL IN THE PRODUCTION OF COMPLEX EQUIPMENT, <u>Major General Leslie E. Simon</u> , Assistant Chief of Ordnance for Research and Development, Office, Chief of Ordnance, Washington 25, D. C.-----	483

TABLE OF CONTENTS

A. ADVANCED STATISTICAL THEORY

FUNDAMENTALS OF ANALYSIS OF VARIANCE, <u>Charles R. Hicks</u> , Assistant Professor of Mathematics and Research Associate in Statistical Laboratory, Purdue University, Lafayette, Indiana-----	547
COMPONENTS OF VARIANCE AND MIXED MODELS, <u>R. L. Anderson</u> , University of North Carolina, Raleigh, North Carolina-----	633
EXPERIMENTS WITH MANY FACTORS, <u>K. A. Brownlee</u> , Statistical Research Center, The University of Chicago, Chicago 37, Illinois-----	565
ANALYSIS OF COVARIANCE, <u>Irving W. Burr</u> , Professor of Mathematics and Research Associate in Statistical Laboratory, Purdue University, Lafayette, Indiana-----	625

B. AIRCRAFT

ULTRASONICS - THEORY AND PRACTICE, <u>W. C. Hitt</u> , Assistant Chief, Quality Control, Douglas Aircraft Company, Incorporated, Santa Monica, California-----	57
IMPROVING VENDOR QUALITY PERFORMANCE, <u>David A. Hill</u> , Director of Quality Control, Hughes Aircraft Company, Culver City, California-----	213
THE TEST PILOT'S ROLE IN QUALITY CONTROL, <u>John I. Nestel</u> , Director of Quality Control, Aviation Engineering Division, Avien-Kniickerbocker, Incorporated, Woodside 77, New York-----	211
S.Q.C. APPLICATIONS FOR IMPROVING AIRCRAFT AND ENGINE MAINTENANCE, <u>A. M. Hull</u> , Supervisor of Maintenance, and <u>W. W. Wilcox</u> , Manager of Inspection and Quality Control, United Air Lines, South San Francisco, California-----	333
THE AIR FORCE PROCUREMENT QUALITY CONTROL PLAN, <u>Carl F. Damberg</u> , Colonel, USAF, Chief, Quality Control, Headquarters Air Material Command, Wright-Patterson Air Force Base, Ohio-----	499
ESTABLISHMENT OF QUALITY LEVEL THRU COMPONENT AND SYSTEM TESTING <u>Ralph S. Reade</u> , Chief of Systems Installations, Consolidated Vultee Aircraft Corporation, Fort Worth, Texas-----	627

C. ARMED SERVICES - ORDNANCE

THE USE OF CONTINUOUS SAMPLING IN AMMUNITION PROCUREMENT, <u>Robert L. Storer</u> , Chief, Quality Control Branch, Ordnance Ammunition Center, United States Army, Joliet, Illinois-----	523
STATISTICAL QUALITY CONTROL IN THE PRODUCTION OF COMPLEX EQUIPMENT, <u>Major General Leslie E. Simon</u> , Assistant Chief of Ordnance for Research and Development, Office, Chief of Ordnance, Washington 25, D. C.-----	483

RESEARCH, DEVELOPMENT, PRODUCTION AND THE INSPECTION OF PRODUCT, Commander <u>F. W. Russe, Jr.</u> , Assistant Division Director, Quality Control Division, Bureau of Ordnance, Navy Department Washington, D. C.-----	647
D. AUTOMOTIVE	
QUALITY CONTROL AT WARNER GEAR, <u>Francis E. Jolliffe</u> , Supervisor of Inspection, Warner Gear Division Borg-Warner Corporation, Muncie, Indiana-----	229
IMPROVING THE QUALITY OF INCOMING MATERIAL, <u>Stephen J. Rogers</u> , Manager, Material Quality Section, Ford Division of the Ford Motor Company, Detroit, Michigan-----	271
A QUICK METHOD OF DETERMINING THE CHARACTERISTICS OF A FREQUENCY DISTRIBUTION, <u>Arthur Bender, Jr.</u> , Quality Engineer, Delco- Remy Division, General Motors Corporation, Anderson, Indiana---	513
STATISTICAL CONTROL OF COMPLEX PROCESSES, <u>James V. Strela</u> , Staff Statistician, Thompson Products, Incorporated, Cleveland, Ohio-----	385
E. BUSINESS OPERATIONS	
QUALITY CONTROL AT WORK IN AIRLINE ACCOUNTING, <u>Winston C. Dalleck</u> , Superintendent of Quality Control, United Air Lines, Inc., Chicago 38, Illinois-----	489
SOME APPLICATIONS OF QUALITY CONTROL TECHNIQUES TO CLERICAL WORK, <u>Robert B. Selover</u> , Director of Personnel Research, Prudential Insurance Company of America, Newark 1, New Jersey-----	147
STATISTICAL TECHNIQUE FOR FORECASTING SALES AND THE LIASON WITH PURCHASING, SCHEDULING, PRODUCTION, SHIPPING, AND INVENTORY CONTROL, <u>Guy G. Parkin</u> , Director Industrial Statistical Control, Minnesota Mining and Manufacturing Company, St. Paul, Minnesota-----	85
STATISTICAL METHODS FOR APPRAISING PUBLIC UTILITY PROPERTY, <u>Elbert T. Magruder</u> , Statistician - General Research, The Chesapeake and Potomac Telephone Companies, Washington, D. C.-----	27
QUALITY INCENTIVE, <u>John F. Wagner</u> , College of Engineering, University of Colorado, Boulder, Colorado-----	565
QUALITY CONTROL LOOKS AT THE FINANCIAL STATEMENT, <u>J. Leslie Lenton</u> , Works Manager, American Machine and Foundry Company, Buffalo, New York-----	19
DEPARTMENT STORE USES OF STATISTICAL QUALITY CONTROL, <u>Claude S. Brinegar</u> , Economic Consultant, The Emporium, San Francisco, California-----	311

F. CHEMICAL

REPLICATION DEGENERACY, D. S. Villars, Research Scientist, United States Naval Ordnance Test Station (Inyokern), China Lake, California----- 135

FINDING AND MEASURING THE EFFECTS OF ASSIGNABLE CAUSES, Cuthbert Daniel, Consultant, New York 33, New York----- 377

VARIABILITY PROBLEMS IN THE PHARMACEUTICAL INDUSTRY, Raymond L. Thatcher, Manager, Quality Control Division, E. R. Squibb and Sons, Division of Mathieson Chemical Corporation, New Brunswick, New Jersey----- 261

THE ROLE OF STATISTICAL QUALITY CONTROL IN TODAY'S CHEMICAL COMPANY, Maynard S. Renner, Staff Assistant to Vice President of Research, Dewey and Almy Chemical Company, Cambridge, Massachusetts----- 515

STATISTICAL QUALITY CONTROL IN A PETROLEUM REFINERY, John T. Walter, School of Business Administration, University of Pittsburgh, Pittsburgh 13, Pennsylvania----- 249

APPLICATIONS OF STATISTICAL METHODS TO THE CONTROL OF REFINERY OPERATIONS, W. Harold White, Research Chemist, A. J. Stephenson, and L. C. Greenop, Imperial Oil Limited, Sarnia, Ontario, Canada----- 125

CORRELATION ANALYSIS IN BATCH PROCESS CONTROL, John D. Hinchey, Quality Supervisor, Monsanto Chemical Company, Springfield, Massachusetts----- 101

G. COMPLEX ASSEMBLIES

STATISTICAL QUALITY CONTROL IN THE PRODUCTION OF COMPLEX EQUIPMENT, Major General Leslie E. Simon, Assistant Chief of Ordnance for Research and Development, Office, Chief of Ordnance, Washington 25, D. C.----- 483

QUALITY CONTROL OF COMPLEX ASSEMBLIES, Paul A. Robert, International Business Machines Corporation, Endicott, New York----- 155

H. ELECTRONICS

STATISTICAL DESIGN IN ELECTRONICS PRODUCTION - LINE EXPERIMENTATION, Frank Caplan, Jr., Supervisor of Process Quality Control, General Electric Company, Syracuse, New York----- 15

PROCESS CAPABILITY CONSIDERATIONS IN PRODUCT AND PROCESS DESIGN, Leo J. Jacobson, Manager, Quality Control Department, International Resistance Company, Philadelphia 8, Pennsylvania----- 443

AN ENGINEER EVALUATES STATISTICAL METHODS, Nello Coda, Chief Electrical Engineer, Erie Resistor Corporation, Erie, Pennsylvania----- 509

I. GENERAL INTEREST

QUALITY CONTROL LOOKS AT THE FINANCIAL STATEMENT, <u>J. Leslie Lenton,</u> Works Manager, American Machine and Foundry Company, Buffalo, New York-----	19
CAN INCENTIVES AND QUALITY LIVE TOGETHER, <u>Wayne M. Biklen,</u> Director of Quality Control, American Safety Razor Corporation, Brooklyn 1, New York-----	617
THE APPLICATION OF QUALITY CONTROL TECHNIQUES IN DETERMINING WORK ASSIGNMENTS AND STANDARDS, <u>Solomon Barkin,</u> Research Director, Textile Workers Union of America, CIO, 99 University Place, New York 3, New York-----	471
INSTALLATION OF A QUALITY CONTROL SYSTEM, <u>Warren E. Jones,</u> Quality Control Consultant, Management Controls, Des Plaines, Illinois	369
ENGINEERING STANDARDS AND TOLERANCES, <u>Ervin E. Schiesel,</u> Technical Director, The Mattatuck Manufacturing Company, Waterbury 20, Connecticut-----	317
COST OF QUALITY, <u>W. H. Lesser,</u> General Electric Company, Schenectady, New York-----	419
SOME USES OF STATISTICS IN PLANT MAINTENANCE, <u>J. Armstrong, Jr.,</u> Maintenance Engineer, E. I. DuPont de Nemours and Company, Incorporated, Richmond, Virginia-----	199
VISUAL AIDS TELL THE QUALITY CONTROL STORY, <u>Paul C. Clifford,</u> Associate Professor of Mathematics, State Teachers College, Montclair, New Jersey-----	535
J. INCENTIVES	
CAN INCENTIVES AND QUALITY LIVE TOGETHER, <u>Wayne M. Biklen,</u> Director of Quality Control, American Safety Razor Corporation, Brooklyn 1, New York-----	617
QUALITY INCENTIVE, <u>John F. Wagner,</u> College of Engineering, University of Colorado, Boulder, Colorado-----	565
K. METALS	
A SURVEY OF THE USE OF STATISTICAL METHODS BY ASQC MEMBERS IN THE METALS INDUSTRY, <u>Frank G. Norris,</u> Wheeling Steel Corporation, Steubenville, Ohio-----	579
STATISTICAL METHODS APPLIED TO STEEL PLANT OPERATIONS, <u>Arthur P.</u> <u>Woods, Jr.,</u> Research Engineer, Armco Steel Corporation, Middleton, Ohio-----	279
QUALITY CONTROL OF TUBULAR STEEL PRODUCTS, <u>W. T. Rogers,</u> Product Engineer, National Tube Division, U. S. Steel Corporation, Loraine, Ohio-----	289

FOUNDRY QUALITY CONTROL FOR SHORT RUNS, <u>Allin P. Deacon</u> , Quality Control Supervisor, Cocshutt Farm Equipment Limited, Brantford, Ontario, Canada-----	185
QUALITY CONTROL IN THE MANUFACTURE OF ZINC - TECHNIQUE OF APPROXIMATING A 3-VARIABLE PROBLEM SOLUTION, <u>Harold L. Springer</u> , Metallurgical Analyst, St. Joseph Lead Company, Monaca, Pennsylvania-----	1
CONTROL OF QUALITY OF BRASS STRIP, <u>L. W. Thelin</u> , Quality Supervisor, Chase Brass and Copper Company, Waterbury 20, Connecticut-----	303
STATISTICAL DESIGN OF EXPERIMENTS IN METALLURGICAL RESEARCH, <u>Saul Gilbert</u> , Assistant Technologist, United States Steel Corporation, Research and Development Laboratory, Pittsburgh, Pennsylvania-----	445
HARDNESS AND ITS MEASUREMENT, <u>Vincent E. Lysaght</u> , Sales Manager, Wilson Mechanical Instrument Division, American Chain and Cable Company, Incorporated, New York, New York-----	67
L. NEW STATISTICAL DEVELOPMENTS	
BINOMIAL PROBABILITY TABLES, <u>Calvin J. Kirohen</u> , Quality Analyst, Lincoln-Mercury Division, Ford Motor Company, Detroit, Michigan	115
CHART CONTROL WITHOUT CHARTS - SIMPLE, EFFECTIVE <u>J. & L. QUALITY PRE-CONTROL</u> , <u>Dorian Shainin</u> , Industrial Consultant, Rath & Strong, Incorporated, Boston 10, Massachusetts-----	405
M. OPERATIONS RESEARCH	
OPERATIONS RESEARCH CONCEPTS USEFUL IN QUALITY CONTROL, <u>Dr. Harold O. Davidson</u> , Senior Staff, Operations Research Office, Chevy Chase, Maryland-----	241
QUALITY CONTROL CONCEPTS USEFUL IN OPERATIONS RESEARCH, <u>P. S. Olmstead</u> , Bell Telephone Laboratories, Inc., Whippany, New Jersey-----	461
N. PAPER AND PRINTING	
QUALITY CONTROL IN PAPER FINISHING, <u>Edward R. Hoffman</u> , Senior A Research, Hammermill Paper Company, Erie, Pennsylvania-----	321
BUILDING QUALITY IN THE PRESS ROOM, <u>William A. MacGrath</u> , Bendix Radio Division of Bendix Aviation Corporation, Towson 4, Maryland-----	457
O. PRECISION MANUFACTURING	
THE PAST, PRESENT, AND FUTURE OF QUALITY CONTROL IN PRECISION MANUFACTURING, <u>E. J. Schaller</u> , Manager Inspection, Lincoln Division, Elgin National Watch Company, Lincoln, Nebraska-----	361

QUALITY CONTROL IN THE MANUFACTURE OF MINIATURE PRECISION BEARINGS, <u>Charles J. Hudson</u> , Consultant, Miniature Precision Bearings, Incorporated, Keene, New Hampshire-----	93
--	----

P. STATISTICAL ANALYSIS

EXPERIMENTS COMPARING TWO METHODS FOR PERCENTAGE DEFECTIVE, <u>Frank Proschan</u> , Manager of Quality Control, Atomic Energy Division, Sylvania Electric Products, Incorporated, Hicksville, New York--	43
---	----

Q. TEXTILES

TEXTILE QUALITY ANALYSIS, <u>Charles C. Wilson</u> , Assistant Director of Research, West Point Manufacturing Company, Shawmut, Alabama----	173
--	-----

QUALITY CONTROL IN GARMENT MANUFACTURING, <u>Robert A. Posey</u> , Quality Control Manager, Peter Pan Manufacturing Corporation, East Newark, New Jersey-----	427
---	-----

THE APPLICATION OF QUALITY CONTROL TECHNIQUES IN DETERMINING WORK ASSIGNMENTS AND STANDARDS, <u>Solomon Barkin</u> , Research Director, Textile Workers Union of America, CIO, 99 University Place, New York 3, New York-----	471
--	-----

LISTING BY AUTHORS

ANDERSON, R. L., Components of Variance and Mixed Models-----	633
ARMSTRONG, J., JR., Some Uses of Statistics in Plant Maintenance---	199
BARKIN, SOLOMON, The Application of Quality Control Techniques in Determining Work Assignments and Standards-----	471
BENDER, ARTHUR, JR., A Quick Method of Determining the Characteris- tics of a Frequency Distribution-----	513
BIKLEN, WAYNE M., Can Incentives and Quality Live Together-----	617
BRINEGAR, CLAUDE S., Department Store Uses of Statistical Quality Control-----	311
BROWMLEE, K. A., Experiments with Many Factors-----	565
BURR, IRVING W., Analysis of Covariance-----	625
CAPLAN, FRANK, JR., Statistical Design in Electronics Production - Line Experimentation-----	15
CLIFFORD, PAUL C., Visual Aids Tell the Quality Control Story-----	535
CODA, NELLO, An Engineer Evaluates Statistical Methods-----	509
DALLECK, WINSTON, Quality Control at Work in Airline Accounting----	489
DAMBERG, CARL F. (Colonel), The Air Force Procurement Quality Control Plan-----	499
DANIEL, CUTHBERT, Finding and Measuring the Effects of Assignable Causes-----	377
DAVIDSON, HAROLD O. (Dr.), Operations Research Concepts Useful in Quality Control-----	241
DEACON, ALLIN P., Foundry Quality Control for Short Runs-----	185
GILBERT, SAUL, Statistical Design of Experiments in Metallurgical Research-----	445
HICKS, CHARLES R., Fundamentals of Analysis of Variance-----	547
HILL, DAVID A., Improving Vendor Quality Performance-----	213
HINCEN, JOHN D., Correlation Analysis in Batch Process Control----	101
HITT, W. C., Ultrasonics - Theory and Practice-----	57
HOFFMAN, EDWARD R., Quality Control in Paper Finishing-----	321
HUDSON, CHARLES J., Quality Control in the Manufacture of Miniature Precision Bearings-----	93

HULL, A. M., S.Q.C. Application for Improving Aircraft and Engine Maintenance-----	333
JACOBSON, LEO J., Process Capability Considerations in Product and Process Design-----	443
JOLLIFFE, FRANCIS E., Quality Control at Warner Gear-----	229
JONES, WARREN E., Installation of a Quality Control System-----	369
KIRCHEN, CALVIN J., Binomial Probability Tables-----	116
LENTON, LESLIE J., Quality Control Looks at the Financial Statement-	19
LESSER, W. H., Cost of Quality-----	419
LYSAGHT, VINCENT E., Hardness and Its Measurement-----	67
MACCREHAN, WILLIAM A., Building Quality in the Press Room-----	457
MAGRUDER, E. T., Statistical Methods for Appraising Public Utility Property-----	27
NESTEL, JOHN I., The Test Pilot's Role in Quality Control-----	211
NORRIS, FRANK G., A Survey of the Use of Statistical Methods by ASQC Members in the Metals Industry-----	579
OLMSTEAD, P. S., Quality Control Concepts Useful in Operations Research-----	461
PARKIN, G. G., Statistical Technique for Forecasting Sales and the Liaison with Purchasing, Scheduling, Production, Shipping, and Inventory Control-----	85
POSEY, ROBERT A., Quality Control in Garment Manufacturing-----	427
PROSCHAN, FRANK, Experiments Comparing Two Methods for Percentage Defective-----	43
READE, RALPH S., Establishment of Quality Level Thru Component and System Testing-----	627
RENNER, MAYNARD S., The Role of Statistical Quality Control in Today's Chemical Company-----	515
ROBERT, PAUL A., Quality Control of Complex Assemblies-----	155
ROGERS, STEPHEN J., Improving the Quality of Incoming Material-----	271
ROGERS, W. T., Quality Control of Tubular Steel Products-----	289
RUSSE, F. W. (Commander), Research Development, Production and the Inspection of Product-----	647
SCHALLER, E. J., The Past, Present and Future of Quality Control in Precision Manufacturing-----	361

SCHIESEL, ERVIN E., Engineering Standards and Tolerances-----	317
SELOVER, ROBERT E., Some Applications of Quality Control Techniques to Clerical Work-----	147
SHAININ, DORIAN, Chart Control Without Charts - Simple, Effective J. & L. Quality Pre-Control-----	405
SIMON, LESLIE E. (Major General), Statistical Quality Control in the Production of Complex Equipment-----	465
STORER, ROBERT L., The Use of Continuous Sampling in Ammunition Procurement-----	523
STRELA, JAMES V., Statistical Control of Complex Processes-----	385
SPRINGER, HAROLD L., Quality Control in the Manufacture of Zinc - Technique of Approximating a 3-Variable Problem Solution-----	1
THATCHER, RAYMOND L., Variability Problems in the Pharmaceutical Industry-----	261
THELIN, L. W., Control of Quality of Brass Strip-----	303
VILLARS, D. S., Replication Degeneracy-----	135
WAGNER, JOHN F., Quality Incentive-----	555
WALTER, JOHN T., Statistical Quality Control in a Petroleum Refinery	249
WHITE, W. HAROLD, Applications of Statistical Methods to the Control of Refinery Operations-----	125
WILSON, CHARLES C., Textile Quality Analysis-----	173
WOODS, ARTHUR P., Statistical Methods Applied to Steel Plant Operations-----	279
WILCOX, W. W., S.Q.C. Applications for Improving Aircraft and Engine Maintenance-----	333

